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MS APPEAL BRIEF - PATENTS
PATENT
2658-0252P

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of		Before the Board of Appeals	
Jong J. PARK et al.		Appeal No.:	
Appl. No.:	09/725,849	Group:	2675
Filed:	November 30, 2000	Examiner:	A. AWAD
Conf.:	8778		

For: METHOD AND APPARATUS FOR DRIVING LIQUID CRYSTAL DISPLAY

APPEAL BRIEF TRANSMITTAL FORM

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

June 14, 2004

Sir:

Transmitted herewith is an Appeal Brief (in triplicate) on behalf of the Appellants in connection with the above-identified application.

☐ The enclosed document is being transmitted via the Certificate of Mailing provisions of 37 C.F.R. § 1.8.

A Notice of Appeal was filed on April 16, 2004.

☐ Applicant claims small entity status in accordance with 37 C.F.R. § 1.27

The fee has been calculated as shown below:

☐ Extension of time fee pursuant to 37 C.F.R. §§ 1.17 and 1.136(a) - $0.00.

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☐ Please charge Deposit Account No. 02-2448 in the amount of $0.00. A triplicate copy of this sheet is attached.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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JTE:RFG/mks
2658-0252P

Attachment(s)

(Rev. 02/08/2004)

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APPEAL BRIEF ON BEHALF OF APPELLANTS: JONG JIN PARK ET AL.

Assistant Commissioner for Patents
Washington, D.C. 20231

June 14, 2004

Sir:

This is an Appeal from the Action of the Examiner dated December 16, 2003, finally rejecting claims 1-8, 11-14, 16 and 18. A copy of the claims appealed are attached as an Appendix. The fee of $330.00 for filing a brief in support of an appeal under 37 C.F. R. § 1.17(f) is submitted herewith.

I. REAL PARTY IN INTEREST

The instant application is assigned to LG.Philips LCD Co., Ltd. as recorded May 7, 2001 at Reel 011786, Frame 0149-0151. No other assignments of this application have been made.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences for this application.

III. STATUS OF CLAIMS

Claims 1-14, 16 and 18 are pending in this application. Claims 9 and 10 have been allowed. Claims 1-8, 11-14, 16 and 18 have been rejected. Claims 15, 17 and 19-21 have been canceled.

IV. STATUS OF AMENDMENTS

The Amendment After Final Rejection submitted on March 16, 2004 has been entered according to the Advisory Action of March 25, 2004.

V. SUMMARY OF THE INVENTION

The present invention relates to a liquid crystal display device and a method of operating this device. A traditional arrangement is shown in Fig. 1 with a plurality of liquid crystal pixel cells arranged in a matrix. A gate driver 6 is connected to a series of gate lines extending in the horizontal direction. A data driver 4 is connected to data lines extending in the vertical direction. The gate driver applies a gate pulse as a scanning signal to drive the cells. The period of the gate pulse GP is set to be one frame interval. This is shown in Fig.

2. The data driver applies a video data signal Vdata, also shown in Fig. 2.

The present invention uses a different arrangement. As shown in Fig. 9, the cells are also arranged in a matrix with a gate driver 26 and data driver 24 attached to corresponding gate lines and data lines. However, in this arrangement the gate pulse GP is applied twice every frame rather than once every frame. The data driver is synchronized with the gate pulse to apply video data signals including an ON data and an OFF data to the data lines. These pulses are shown in Fig. 5, which can be compared with Fig. 2 to see the difference between the present invention and the traditional technique. The result of this arrangement is that the cells are completely discharged and the problem of residual images being carried from one frame to the next is removed. As shown in Fig. 6, the traditional technique causes the polarity to be inverted in every frame. However, in the present invention the polarity changes from either positive or negative at the beginning of the frame to zero or ground voltage in the second half of each frame.

VI. ISSUES

(1) The first issue is whether the Examiner is correct in rejecting claims 1, 4, 5, 8, 11-14 and 16 as being anticipated by Takahashi (U.S. Patent No. 6,297,792). In particular, it is

questioned whether the Takahashi reference shows each and every feature of the claimed invention.

(2) The second issue is whether the Examiner was correct in rejecting claims 2, 3, 6 and 7 as being obvious over Takahashi in view of Miwa (U.S. Patent No. 6,369,469). In particular, a question is whether it would be obvious to one skilled in the art to use Miwa's teaching in the Takahashi device as suggested by the Examiner.

(3) The third question is whether claim 18 would be obvious over Takahashi in view of Kubota (U.S. Patent No. 5,907,313). In particular, the question is whether it would be obvious to one of ordinary skill in the art to include the teachings of Kubota in Takahashi.

VII. GROUPING OF CLAIMS

1. Group 1 includes claims 1 and 4.
2. Group 2 includes claims 5 and 8.
3. Group 3 includes claims 11 and 12.
4. Group 4 includes claim 13.
5. Group 5 includes claims 14 and 16.
6. Group 6 includes claims 2 and 3.
7. Group 7 includes claims 6 and 7.
8. Group 8 includes claim 18.

VIII. ARGUMENTS

The Examiner rejected claims 1, 4, 5, 8, 11-14 and 16 as being anticipated by Takahashi. Applicants disagree that the Takahashi reference shows all of the features of the claimed invention.

The Examiner stated that Takahashi teaches applying a first signal to the liquid crystal pixel cells through the data lines for charging during the beginning of a frame and applying a second signal different from the first signal to the liquid crystal pixel cells through the data lines for discharging during an ending of the frame. However, Applicants submit that the Takahashi reference fails to suggest all of the features of the claimed invention.

First, the present invention has a first signal and a second signal which are sequentially applied to the data lines in a frame. In particular, the first signal (pixel on data) is applied to the data lines in synchronization with a first gate pulse applied to a gate line, for example, during a first half of one frame (one vertical period), and the second signal (pixel off data) is applied to the data lines in synchronization with a second gate pulse applied to the gate line, for example, during a second half of one frame.

This can be compared with the arrangement in Takahashi, which discloses that a charging mode, in which a first selecting

voltage is applied, is set as a predetermined period in a first horizontal period, an overcharging period, in which a precharge voltage is applied, is set as the first half of a second horizontal period after one vertical period, and a discharging mode, in which a second selecting voltage is applied, is set as the second half of the second horizontal period.

Thus, Takahashi discloses applying a first selecting voltage in a predetermined period of the first horizontal period in one frame and applying a second selecting voltage in the second half of the first horizontal period in next frame. In Takahashi, the second horizontal period is to indicate the first horizontal period of the next frame.

Furthermore, Takahashi discloses applying data signal in the predetermined period of the first horizontal period and applying data signal in the first half and the second half of the second horizontal period (that is, the first horizontal period of the next frame).

In the present invention, the first signal (pixel on data) is applied during the beginning of a frame, for example, the first half of the frame, and the second signal (pixel off data) is applied during the ending of the frame, for example, the second half of the frame.

Claims 1 and 4 constitute the first group. Independent claim 1 describes the method of driving the display as including

applying a first signal through the data lines for charging during the beginning of a frame and applying a second signal different from the first signal through the data lines for discharging during an ending of the frame. Applicants submit that Takahashi fails to teach that the first signal is applied during the beginning of the frame and the second signal applied during the ending of the frame. Accordingly, Applicants submit that claim 1 is not anticipated by Takahashi. Claim 4 depends from claim 1 and also specifies that the gate pulse is applied twice during the frame to apply the two signals.

Claims 5 and 8 constitute the second group. Independent claim 5 describes the driving apparatus as a data driver to apply the first signal for charging during the beginning of a frame and a second signal for discharging during the ending of the frame and a gate driver for applying a gate pulse signal with at least two gate pulses to sequentially apply the first and second signals. Applicants submit that Takahashi does not show the features of claim 5 either. In addition to the data driver which charges and discharges during the beginning and ending of the frame, this claim recites the gate driver which applies two gate pulses and sequentially applies the first and second signals. Applicants submit that Takahashi does not show the first and second signals applied during the beginning and ending of the frames and the two gate pulses which apply these

signals. Claim 8 depends from claim 5 and also describes the gate pulse as being generated at the start of the frame and at the midpoint of the frame. Applicants submit that Takahashi does not show these features.

Claims 11 and 12 constitute the third group. Claim 11 is a method claim which specifies that the liquid crystal cell is charged during the beginning portion of the frame and that it is completely discharged before an end of the frame. Applicants submit that the Takahashi reference does not show this combination of features either. In particular, the reference does not show charging during the beginning and discharging before an end of the frame as presently described. Claim 12 depends from claim 11 and further recites the length of the relative periods of the charging and discharging which is not shown in any fashion in Takahashi.

Claim 13 constitutes the fourth group. This claim describes a method of applying either positive or negative charges through data lines during a beginning of a frame, applying no charge during an ending of the frame and applying an opposite charge during a beginning in the next frame. The Takahashi reference does not show the use of no charge during an ending of the frame and does not show this combination of three steps. Accordingly, Applicants submit that claim 13 is likewise allowable over this reference.

Claims 14 and 16 constitute the fifth group. Claim 14 describes the method as including the steps of activating the transistors at least twice during one frame, applying a gate pulse signal which has two gate pulses within one frame, applying a video data signal to charge a pixel element including applying either positive or negative charges during the beginning of the frame, applying no charge during an ending of the frame and applying an opposite charge during the beginning of the next frame. Applicants submit that this method is not shown by Takahashi since it does not include the application of no charge during an ending of the frame along with the other steps of applying either a positive or negative charge, the activation of the transistor placed during a frame and having two gate pulses within one frame. Claim 16 depends from claim 14 and further describes that one of the gate pulses is applied at midpoint. Applicants submit that these limitations are not seen in Takahashi et al.

The Examiner rejected claims 2, 3, 6 and 7 as being obvious over Takahashi in view of Miwa et al. (U.S. Patent No. 6,369,469). Applicants submit that claims 2, 3, 6, and 7 are not obvious over this combination of references.

First, these dependent claims depend from claims 1 and 5, which are allowable as indicated above. The Examiner states that

Miwa teaches the use of a ferro-electric display and a display having a response time of less 10ms.

Claims 2 and 3 constitute the sixth group. Applicants submit that it would not be obvious to one of ordinary skill in the art to add the teaching of Miwa to Takahashi in order to show the teachings of dependent claims 2 and 3 as they depend from claim 1.

Claims 6 and 7 constitute the seventh group and includes similar limitations to claims 2 and 3. However, these claims depend from claim 5 and thus include the limitations presented there. Applicants submit that claims 6 and 7 are allowable for similar reasons discussed above in regard to claims 2 and 3.

The eighth group includes claim 18 but has been rejected as being obvious over Takahashi in view of Kubota et al. (U.S. Patent No. 5,907,313). The Examiner admits that Takahashi does not show a gate driver including a plurality of gate driver circuits connected together in series. The Examiner relies on Kubota to show a liquid display device that includes a plurality of gate drivers connected in a series. Applicants submit that there is no motivation shown for one skilled in the art to include the gate driver of Kubota et al. into the device of Takahashi. In addition, claim 18 also describes the gate driver as having at least two gate pulses within one frame interval and the data driver for applying the signal in accordance with the

gate pulse signal to charge the pixel element. Accordingly, Applicants submit that claim 18 is also allowable based on these features.

IX. CONCLUSION

In summary, the various rejections of the Examiner are in error. It is believed that Appellants have countered all of the reasons given for the rejections of the appealed claims and thus these rejections do not appear to be proper. Accordingly, it is respectfully requested that the Examiner reverse the rejections of the claims 1-8, 11-14, 16 and 18.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,
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APPENDIX OF CLAIMS

X. CLAIMS APPEALED

1. A method of driving a liquid crystal display having liquid crystal pixel cells arranged at each intersection between a plurality of gate lines and a plurality of data lines in a matrix type and being driven with thin film transistors, said method comprising:

applying a first signal to the liquid crystal pixel cells through said data lines for charging thereof during a beginning of a frame; and

applying a second signal different from said first signal to the liquid crystal pixel cells through said data lines for discharging thereof during an ending of the frame.

2. The method according to claim 1, wherein each of the liquid crystal pixel cells includes a liquid crystal layer formed of any one of a ferro-electric liquid crystal and an anti-ferro-electric liquid crystal.

3. The method according to claim 1, wherein each of the liquid crystal pixel cells includes a liquid crystal layer formed of a twisted nematic liquid crystal having a response speed of less than 10ms.

4. The method according to claim 1, further comprising the step of:

applying a gate pulse to the gate lines twice during the frame to sequentially apply the first signal and the second signal to the liquid crystal pixel cells.

5. A driving apparatus for a liquid crystal display having liquid crystal pixel cells arranged in a matrix at each intersection between a plurality of gate lines and a plurality of data lines and being driven with thin film transistors, said apparatus comprising:

a data driver to apply a first signal to the liquid crystal pixel cells for charging thereof during a beginning of a frame and to apply a second signal different from said first signal to the liquid crystal pixel cells for discharging thereof during an ending of the frame; and

a gate driver to apply a gate pulse signal with at least two gate pulses to the gate lines during the frame to sequentially apply the first signal and the second signal to the liquid crystal pixel cells.

6. The driving apparatus according to claim 5, wherein each of the liquid crystal pixel cells includes a liquid crystal

layer formed of any one of a ferro-electric liquid crystal and an anti-ferro-electric liquid crystal.

7. The driving apparatus according to claim 5, wherein each of the liquid crystal pixel cells includes a liquid crystal layer formed of a twisted nematic liquid crystal having a response speed of less than 10ms.

8. The driving apparatus according to claim 5, wherein the gate driver generates a gate pulse at a start of the frame and a mid-point of the frame.

11. A method of operating a liquid crystal cell comprising:

charging a liquid crystal cell during a beginning portion of a frame; and

completely discharging the liquid crystal cell before an end of the frame.

12. The method according to claim 11, wherein a period from charging of the liquid crystal cell to completely discharging of the liquid crystal cell is shorter than a period that completely discharging of the liquid crystal cell is maintained.

13. A method of charging a liquid crystal cell comprising:

applying any one of a positive and negative charges to a pixel electrode through data lines of the liquid crystal cell during a beginning of a frame;

applying no charge to the pixel electrode of the liquid crystal cell during an ending of the frame; and

applying an opposite charge compared with a beginning of previous frame to the pixel electrode of the liquid crystal cell through said data lines during a beginning of the next frame.

14. A method of driving a liquid crystal display (LCD) device comprising at least one thin film transistor (TFT), the method comprising:

activating the TFT of a pixel element at least twice during a one frame interval;

applying a gate pulse signal to the TFT connected to a pixel element, the gate pulse signal having at least two gate pulses within a one frame interval;

applying a video data signal to the pixel element in accordance with the gate pulse signal to charge the pixel element;

wherein the step of applying the video data signal comprises:

applying any one of the positive and negative charges to the pixel element during a beginning of a frame;

applying no charge to the pixel element during an ending of the frame; and

applying an opposite charge compared with a beginning of previous frame to the pixel element during a beginning of the next frame.

16. The method of claim 14, wherein at least one of the gate pulses is applied at a mid-point of the frame interval.

18. An apparatus for driving a liquid crystal display device comprising at least one thin film transistor (TFT), comprising:

a gate driver, including a plurality of gate drive circuits connected in series, to apply a gate pulse signal to the TFT connected to a pixel element, the gate pulse signal having at least two gate pulses within a one frame interval; and

a data driver to apply a video data signal to the pixel element in accordance with the gate pulse signal to charge the pixel element.